

## CLAIMS

What is claimed is:

1. A multi-channel feed network comprising:
  - a common waveguide section;
  - a low pass waveguide section connected at substantially a perpendicular angle with the common waveguide section, the low pass waveguide section comprising:
    - waveguide having a cross section substantially matching a cross section of the common waveguide section;
    - a band reject filter formed with slots in the waveguide of the low pass waveguide section; and
    - a high pass waveguide section connected at substantially a perpendicular angle with the common waveguide section.
2. The multi-channel feed network of claim 1,
  - wherein the common waveguide section comprises a circular waveguide,
  - wherein the low pass waveguide section comprises a circular waveguide, and
  - wherein the high pass waveguide section comprises a rectangular waveguide.
3. A multi-channel feed network comprising:
  - a common waveguide section;
  - a first high pass waveguide section connected at substantially a perpendicular angle with the common waveguide section;
  - a second high pass waveguide section connected at substantially a perpendicular angle with the common waveguide section, and substantially a 90-degree angle with the first high pass waveguide section;
  - a third high pass waveguide section connected at substantially a perpendicular angle with the common waveguide section, and substantially a 90-degree angle with the second high pass wave guide section;

a fourth high pass waveguide section connected at substantially a perpendicular angle with the common waveguide section, and substantially a 90-degree angle with the third high pass wave guide section;

a first power divider having a first terminal for connecting to the first high pass waveguide section, a second terminal for connecting to the third high pass section, and a third terminal; and

a second power divider having a first terminal for connecting to the second high pass waveguide section, a second terminal for connecting to the fourth high pass section, and a third terminal.

4. The multi-channel feed network of claim 3, wherein the feed network is formed as a single integrated unit.

5. The multi-channel feed network of claim 4, wherein the feed network is die cast as two symmetrical pieces attached together.

6. The multi-channel feed network of claim 4, further comprising:

a 90° hybrid coupler having a first terminal coupled to the third terminal of the first power divider, a second terminal coupled to the third terminal of the second power divider, a third terminal and a fourth terminal; and

a 90° hybrid coupler having a first terminal coupled to the third terminal of the first power divider, a second terminal coupled to the third terminal of the second power divider, a third terminal and a fourth terminal.

7. The multi-channel feed network of claim 6, further comprising:

a ½ wavelength section connecting the fourth high pass waveguide section to the second 90° hybrid coupler;

a first 1/4 wavelength section connecting the fourth terminal of the first 90° hybrid coupler to the first terminal of the second power divider; and

a second 1/4 wavelength section connecting the third terminal of the second 90° hybrid coupler to the second terminal of the first power divider.

8. The multi-channel feed network of claim 7, wherein the feed network is formed as a single integrated unit.

9. The multi-channel feed network of claim 8, wherein the feed network is die cast as two symmetrical pieces attached together.

10. The multi-channel feed network of claim 6, further comprising:

a first  $1/4$  wavelength section connecting the second high pass waveguide section to the second terminal of the second  $90^\circ$  hybrid coupler; and

a second  $1/4$  wavelength section connecting the third high pass waveguide section to the second terminal of the first  $90^\circ$  hybrid coupler.

11. The multi-channel feed network of claim 3, further comprising:

a low pass waveguide section connected at substantially a perpendicular angle with the common waveguide section, the low pass waveguide section comprising:

a circular waveguide having a cross section substantially matching a cross section of the common waveguide section; and

a band reject filter formed with slots in the waveguide of the low pass waveguide section.

12. The multi-channel feed network of claim 11, wherein the low pass waveguide section is formed as a single integrated unit.

13. The multi-channel feed network of claim 12, wherein the low pass waveguide section is diecast as two symmetrical parts.

14. The multi-channel feed network of claim 6, further comprising:

a polarizer coupling the low pass waveguide section to an orthogonal mode transducer.

15. The multi-channel feed network of claim 14, further comprising:  
an antenna connected on an opposing side of the common waveguide from the low pass waveguide section.
16. A multi-channel feed network comprising:  
a common waveguide section;  
a high pass waveguide section having four input ports connected to the common waveguide section, and two output ports each providing two orthogonal mode signals, wherein the common waveguide section and the high pass waveguide section are manufactured as an integrated unit formed from two diecast halves;  
an antenna connected to an input of the common section attached to one side of the integrated unit; and  
a low pass waveguide section connected an output of the common section attached to an opposing side of the integrated unit from the antenna.